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(71) Applicant:
Sumitomo Wiring Systems, Ltd.
Yokkaichi-City, Mie, 510-8503 (JP)

(72) Inventors:
- **Saito, Masashi,**
  Sumitomo Wiring Systems, Ltd.
  Yokkaichi-city, Mie 510-8503 (JP)
- **Kolde, Takashi,**
  Sumitomo Wiring Systems, Ltd.
  Yokkaichi-city, Mie 510-8503 (JP)
- **Aoyama, Masahiko,**
  Sumitomo Wiring Systems, Ltd.
  Yokkaichi-city, Mie 510-8503 (JP)

(74) Representative:
Müller-Boré & Partner
Patentanwälte
Grafinger Strasse 2
81671 München (DE)

(54) A shielding terminal and method for connecting a shielding terminal

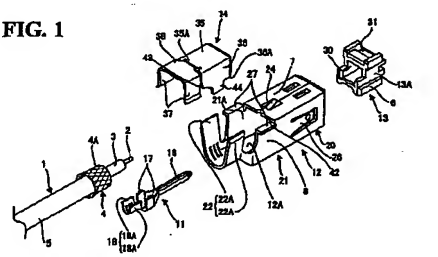
(57) [Object]

To provide a shielding terminal capable of providing improved shielding characteristics.

[Solution]

A shielding terminal is comprised of an inner terminal 11 to be connected with a core 2, an outer terminal 12 to be connected with a braided wire 4, a dielectric element 13 for insulating the two terminals 11 and 12 from each other, and a cover 14 to be mounted on an upper portion of the outer terminal 12. After the core 2 is fastened to an inner fastening portion 18 of the inner terminal 11 outside the outer terminal 12, the inner terminal 11 is inserted into the dielectric element 13. An outer fastening portion 22 of the outer terminal 12 is crimped into connection with a section 4A of the braided wire 4 folded back around an end of a sheath 5. In the center of the outer terminal 12, the upper surface is opened to provide an open space 21A. The fastened portion of the core 2 is covered on four sides by mounting the cover 14 to cover the open space 21A.

FIG. 1



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Description

[0001] The present invention relates to a shielding terminal to be connected with an end of a shielded cable and to a method for connecting a shielding terminal with an end of a shielded cable.

[0002] A known shielding terminal of this time is shown in FIGS. 18 and 19. This shielding terminal is comprised of an inner terminal "a" to be connected with a mating terminal, a dielectric element "b" for accommodating the inner terminal "a", and an outer terminal "c" in the form of a rectangular tube for accommodating the dielectric element "b". A core fastening portion "h" provided in the inner terminal "a" is crimped into connection with an end of a core "e" of a shielded cable "d", and a braided wire fastening portion "i" and a sheath fastening portion "j" provided in the outer terminal "c" are crimped into connection with an end of a braided wire "f" and an end of a sheath "g", respectively.

[0003] When the shielding terminal is crimped by a terminal mounting apparatus, the core "e", the braided wire "f" and the sheath "g" are simultaneously connected. It is essential to form windows "k" in the upper and lower surfaces of the outer terminal "c", particularly, so that a crimper can access and crimp the core fastening portion "h" of the inner terminal "a" accommodated in the outer terminal "c".

[0004] This means that a portion of the shielding terminal fastened to the core "e" has its upper and lower surfaces exposed through the windows "k", thereby undesirably reducing shielding characteristics such as a radiation characteristic.

[0005] In view of the above problem, an object of the present invention is to provide a shielding terminal and a connection method therefor allowing for an improved shielding characteristics.

[0006] This object is solved according to the invention by a shielding terminal according to claim 1 and by a method according to claim 8. Preferred embodiments of the invention are subject of the dependent claims.

[0007] According to the invention, there is provided a shielding terminal to be connected with an end of a shielded cable comprised of a core provided substantially in the center, a shield layer, preferably a braided wire, coaxially surrounding the core via an insulating layer, and a sheath surrounding the braided wire, comprising:

an inner terminal to be connected with the core,
a dielectric element for at least partly accommodating the inner terminal,
an outer terminal which is adapted to at least partly accommodate the dielectric element and to be connected with the shield layer or braided wire, and
a cover having a covering portion for substantially covering an open space around a section of the inner terminal connected with the core, and at least one mount portion mountable on a section or portion of the outer terminal to be connected with the shield layer or braided wire,
wherein at least one assembling piece to be arranged substantially along a side wall of the outer terminal is formed with at least one displacement restricting portion for restricting a displacement of the cover.

[0008] Accordingly, since the open space around the section of the inner terminal fastened to the core is covered by the cover, shielding characteristics such as a radiation characteristic can be improved. Since this cover is mountable on the connected section of the outer terminal, the shielding terminal can be simplified in its construction without necessitating a separate mounting structure. Further, the displacement of the cover can be restricted since the cover is provided with the displacement restricting portion.

[0009] According to a preferred embodiment of the invention, the assembling piece extends from the covering portion of the cover.

[0010] Preferably, the displacement restricting portion restricts the displacement of the cover by being held substantially in contact with a connecting wall substantially connecting the side walls of the outer terminal, the connecting wall being preferably a bottom wall of the outer terminal.

[0011] Accordingly, the downward displacement of the cover inside the outer terminal can be restricted.

[0012] Further preferably, each displacement restricting portion comprises a first displacement restricting portion to be held in contact with the side wall of the outer terminal and a second displacement restricting portion to be held in contact with the connecting wall.

[0013] Still further preferably, the displacement restricting portion is to be inserted or fitted between the side wall of the outer terminal and a side wall of the dielectric element, wherein the displacement restricting portion preferably prevents the assembling piece from being bent inward of the outer terminal.

[0014] Still further preferably, the displacement restricting portion prevents the assembling piece from being bent inward of the outer terminal by being inserted between the side wall of the outer terminal and a side wall of the dielectric element.

[0015] Accordingly, the displacement restricting portion prevents the assembling piece from being bent inward of the outer terminal.

[0016] Most preferably, the mount portions comprise a clip-lock construction.

[0017] According to the invention, there is further provided a method for connecting a shielding terminal, in particular according to the invention or an embodiment thereof, with an end of a shielded cable comprised of a core provided substantially in the center, a shield layer coaxially surrounding the core via an insulating layer, and a sheath surrounding the shield layer, com-

prising the steps of:

connecting an inner terminal with the core,
at least partly accommodating the inner terminal in a dielectric element,
at least partly accommodating the dielectric element in an outer terminal and connecting the outer terminal with the shield layer, and
substantially covering an open space around a section of the inner terminal connected with the core by means of a cover having a covering portion,
wherein the covering step comprises:
a step of mounting at least one mount portion of the cover on a section or portion of the outer terminal connected with the shield layer, and
a step of arranging at least one assembling piece substantially along a side wall of the outer terminal for restricting a displacement of the cover.

[0018] According to a preferred embodiment of the invention, the covering step further comprises a step of bringing at least one displacement restricting portion into contact with a connecting wall substantially connecting the side walls of the outer terminal, the connecting wall being preferably a bottom wall of the outer terminal.

[0019] These and other objects, features and advantages of the present invention will become more apparent upon a reading of the following detailed description and accompanying drawings in which:

FIG. 1 is an exploded perspective view of a shielding terminal according to one embodiment of the invention,
FIG. 2 is an exploded side view of the shielding terminal,
FIG. 3 is a side view of a dielectric element,
FIG. 4 is a rear view of the dielectric element,
FIG. 5 is a plan view of the dielectric element,
FIG. 6 is a front view of the dielectric element,
FIG. 7 is a side view of an outer terminal,
FIG. 8 is a bottom view of the outer terminal,
FIG. 9 is a front view of the outer terminal,
FIG. 10 is a section along A-A of FIG. 9,
FIG. 11 is a plan view of the outer terminal,
FIG. 12 is a perspective view of the shielding terminal before a cover is mounted,
FIG. 13 is a side view in section of the shielding terminal before the cover is mounted,
FIG. 14 is a side view of the shielding terminal,
FIG. 15 is a side view in section of the shielding terminal,
FIG. 16 is a plan view of the shielding terminal,
FIG. 17 is a plan view in section of the shielding terminal,
FIG. 18 is a perspective view of a prior art shielding terminal, and
FIG. 19 is a plan view of the prior art shielding terminal.

[0020] Next, one embodiment of the invention is described in detail with reference to FIGS. 1 to 17.

[0021] In this embodiment is illustrated a male shielding terminal 10, which is to be mounted on one end of a shielded cable 1. In the following description, a side of the shielding terminal 10 to be connected or mated with a mating terminal fitting (not shown) is referred to as a front or leading side, and reference is made to FIG. 2 for upper and lower sides, the upper side being preferably a cover side, where a cover 14 is to be arranged while the lower side is preferably a substantially closed side.

[0022] In the shielding cable 1, a core 2 formed by bundling a plurality of strands, an insulating layer 3, a braided wire as a shield layer 4 and a sheath 5 are coaxially provided in this order from the inner side as shown in FIGS. 1, 2 and 17. End processing is applied to one end of the shielded cable 1 by stripping an end of the sheath 5 to expose a section of the braided wire 4, preferably folding back at least a part of the exposed section of the braided wire 4 substantially around the sheath 5, and cutting an end of the thus exposed insulating layer 3 to expose the core 2.

[0023] The shielding terminal 10 is, as shown in FIGS. 1 and 2, comprised of an inner terminal 11, a dielectric element 13 for accommodating the inner terminal 11, an outer terminal 12 for at least partly accommodating the dielectric element 13, and a cover 14 to be mounted on the outer terminal 12 preferably from above.

[0024] The inner terminal 11 is formed into a male terminal e.g. by bending and/or folding a conductive metal plate, and is provided with a tab portion 16 to be connected with a mating female inner terminal (not shown). A pair of substantially transversely arranged biting projections 17 which bite in or cut into the inner wall of the dielectric element 13 when the inner terminal 11 is pushed into the dielectric element 13, and an inner fastening portion 18 to be crimped into connection with the core 2 of the shielded cable 1 are successively formed behind the tab portion 16. The inner fastening portion 18 includes a pair of fastening pieces 18A, which are open upward before the core 2 is fastened thereto.

[0025] The outer terminal 12 is also formed e.g. by bending a conductive metal plate and is provided with an accommodating portion 20 preferably in the form of a substantially rectangular tube, a covering wall portion 21 having an open space 21A formed in its upper surface, and an outer fastening portion 22 to be crimped or folded or fastened into connection with the braided wire 4, preferably a folded portion 4A of the braided wire 4 at the end of the shielded cable 1. The accommodating portion 20, the covering wall portion 21 and the outer fastening portion 22 are arranged in this order from the leading end side of the outer terminal 12. In other

words, an upper or lateral wall 7 of the outer terminal 12 is terminated at the rear end of the accommodating portion 20, whereas left and right side walls 8 substantially continuously extend from the accommodating portion 20 to the covering wall portion 21.

[0026] The upper wall 7 of the accommodating portion 20 is formed with a metal locking portion 24 for locking the dielectric element 13 so as to prevent it from coming out through the front opening of the accommodating portion 20. The metal locking portion 24 is formed e.g. by cutting a portion of the upper wall 7 of the accommodating portion 20 and bending this cut portion inwardly so as to extend obliquely, preferably obliquely backward. Further, the bottom wall of the accommodating portion 20 is formed with a stopper 25 for coming substantially into abutment against the rear surface of the dielectric element 13 to substantially prevent it from moving backward (see FIG. 2). Furthermore, the left and right side walls of the accommodating portion 20 are formed with contact pieces 26 which can be elastically brought into contact with a mating outer terminal (not shown).

[0027] The covering wall portion 21 is comprised of the bottom, left and right walls to be closed on three sides, and its upper wall is open to act as the open space 21A. The inner fastening portion 18 of the inner terminal 11 is located inside the covering wall portion 21. The upper edges of the left and right side walls of the covering wall portion 21 transversely bulge out to thereby form stabilizers 27.

[0028] The outer fastening portion 22 includes a pair of fastening pieces 22A, which are open upward before the shielding terminal 10 is mounted on the shielded cable 1 similar to the fastening pieces 18A of the inner fastening portion 18.

[0029] The dielectric element 13 is integrally or unitarily made of an insulating material such as a synthetic resin as shown in FIGS. 3 to 6, and electrically insulates the inner and outer terminals 11, 12 from each other by being mounted therebetween. The dielectric element 13 is at least partly inserted into the accommodating portion 20 of the outer terminal 12 preferably from front and fittable into a preferably rear end side of the accommodating portion 20. Inside the dielectric element 13 is formed an accommodating hole 30 through which the tab portion 16 of the inner terminal 11 is inserted or insertable and which accommodates a portion of the inner terminal 11 preferably from the base end of the tab portion 16 to the biting projections 17. A locking hole 31 into which the metal locking portion 24 of the outer terminal 12 is fittable is formed in the upper surface of the dielectric element 13, and a contact portion 32 to be brought into contact with the stopper 25 of the outer terminal 12 is formed preferably in the lower surface thereof.

[0030] Further, shake preventing portions 6 project outward from the bottom ends of left and right side walls 13A of the dielectric element 13. The shake preventing portions 6 substantially continuously extend from the front end to the rear end of the dielectric element 13. When the dielectric element 13 is mounted in the outer terminal 12, the shake preventing portions 6 come substantially into contact with the side walls 8, thereby positioning the dielectric element 13. At this time, insertion spaces 9 are defined between the side walls 13A of the dielectric element 13 and the side walls 8 of the outer terminal 12 (see in combination with FIG. 17).

[0031] The cover 14 is formed as shown in FIGS. 7 to 11 e.g. by bending a conductive metal plate. The cover 14 has a covering portion 35 for covering an upper or open side of the covering wall portion 21, a pair of assembling pieces 36 which hang down from the opposite side edges of or are bent at an angle different from 0° or 180°, preferably substantially normal with respect to the covering portion 35 and a pair of mount portions 37. Thus, the cover 14 has a substantially U-shaped cross section.

[0032] The covering portion 35 preferably completely covers from the open space 21A in the upper surface of the wall covering portion 21 of the outer terminal 12 up to the outer fastening portion 22 fastened to the shielded cable 1. The covering portion 35 is slightly bent upward in its center position toward its rear end, thereby forming a crease or dimple or stepped portion 35A. On the opposite lateral sides of the crease portion 35A, cuts 43 are made from the opposite side edges of the cover 14. Portions of the cover 14 bent downward and located before the cuts 43 serve as the pair of assembling pieces 36, whereas those located after the cuts 43 serve as the pair of mount portions 37.

[0033] A middle portion of the bottom end of each assembling piece 36 further hangs down to form a second displacement restricting portion 44. A portion of the bottom end of each assembling piece 36 before the second displacement restricting portion 44 serves as a displacement restricting portion 36A, which is to be inserted into the corresponding insertion space 9 when the cover 14 is mounted on the outer terminal 12. Further, when the assembling pieces 36A are mounted in their proper positions with respect to the outer terminal 12, the leading ends of the second displacement restricting portions 44 come into contact with the bottom wall 12A of the outer terminal 12.

[0034] The mount portion 37 are formed by bending at an angle different from 0° or 180°, preferably substantially normal or down the opposite lateral ends of a base plate 38 which is located slightly above the covering portion 35. This pair of mount portions 37 are elastically deformable in directions toward and away from each other, so that they can elastically tightly hold the outer fastening portion 22 crimped into connection with or fastened to the shielded cable 1.

[0035] Next, an operation of mounting the shielding terminal 10 on the end of the shielded cable 1 is described with reference to FIGS. 12 to 17.

[0036] End processing as described above is

applied to the one end of the shielded cable 1.

[0037] First, the fastening pieces 18A of the inner fastening portion 18 of the inner terminal 11 are crimped into connection with the end of the core 2 of the shielded cable 1.

[0038] Subsequently, the dielectric element 13 is at least partly inserted into the accommodating portion 20 of the outer terminal 12 from front. The dielectric element 13 is pushed while elastically deforming the metal locking portion 24. When the contact portion 32 comes into abutment against the stopper 25 as shown in FIG. 13, the metal locking portion 24 is restored to its original shape, thereby being slipped into the locking hole 31, with the result that the dielectric element 13 is fixed in a specified position at the rear end of the accommodating portion 20.

[0039] Subsequently, the inner terminal 11 is inserted into the accommodating portion 20 of the outer terminal 12, and maneuvered by a jig inserted through the open space 21A in the upper surface of the covering wall portion 21 to push the tab portion 16 into the accommodating hole 30 of the dielectric element 13. During this stage, the biting projections 17 bite in the inner walls of the accommodating hole 30, with the result that the inner terminal 11 is fixed while the tab portion 16 is projecting from the dielectric element 13 as shown in FIG. 13. In this way, the inner terminal 11 is accommodated in the outer terminal 12 via the dielectric element 13. Here, the inner fastening portion 18 of the inner terminal 11 is located in the wall covering portion 21 of the outer terminal 12, and the folded portion 4A of the braided wire 4 is located in the outer fastening portion 22 of the outer terminal 12.

[0040] Next, the open outer fastening portion 22 is crimped by a crimper. The two fastening pieces 22A are crimped to surround the folded portion 4A of the braided wire 4 in such a manner that the end of one fastening piece 22A is placed on that of the other fastening piece 22A. In this way, the folded portion 4A of the braided wire 4 and the end of the sheath 5 are fastened by the outer fastening portion 22. At this time, the left and right surfaces of the crimped outer fastening portion 22 are substantially parallel to each other.

[0041] By the above operation, the inner and outer terminals 11, 12 are mounted on the end of the shielded cable 1 as shown in FIGS. 12 and 13. Even in this state, the shielding terminal 10 sufficiently fulfills its functions and has particular advantages. Specifically, since the braided wire 4 and the sheath 5 are fastened by the single outer fastening portion 22 by folding the braided wire 4 back around the sheath 5, the length of the shielding terminal 10 can be shortened as compared with conventional ones in which the braided wire and the sheath are separately fastened.

[0042] Further, since the inner terminal 11 is mounted in advance outside the outer terminal 12 and the crimped inner fastening portion 18 is located in the covering wall portion 21 of the outer terminal 12 to be surrounded on three sides, shielding characteristics such as a radiation characteristic can be improved as compared with conventional shielding terminals in which both upper and lower surfaces are open.

[0043] In this embodiment, the cover 14 is further provided. The cover 14 is so mounted as to substantially cover the open space 21A in the upper surface of the covering wall portion 21 of the outer terminal 12 preferably from an upper or lateral side after the shielded cable 10 is fastened as described above. At this stage, the two mount portions 37 of the cover 14 are pushed while being elastically widened away from each other by the left and right sides of the outer fastening portion 22, until the base plate 38 comes into contact with the upper ends of the outer fastening portion 22. In this way, the mount portions 37 elastically tightly hold the left and right side surfaces of the outer fastening portion 22 to fix the cover 14.

[0044] When the cover 14 is mounted as above, the covering portion 35 completely covers a portion of the outer terminal 12 from the open space 21A in the upper surface of the covering wall portion 21 to the outer fastening portion 22, and the left and right assembling portions 36 substantially cover open rear portions of the left and right side walls 8 of the covering wall portion 21. As a result, the inner fastening portion 18 of the inner terminal 11 crimped into connection with the core 2 of the shielded cable 1 is covered on four sides by the cover 14 and the covering wall portion 21 of the outer terminal 12.

[0045] Further, the bottom ends of the second displacement restricting portions 44 extending from the middle of the assembling pieces 36 are in contact with the bottom wall 12A of the outer terminal 12 as shown in FIGS. 14 and 15 and prevent the cover 14 from being displaced.

[0046] Furthermore, the assembling pieces 36 are arranged along the side walls 8 of the outer terminal 12 as shown in FIGS. 16 and 17, and the displacement restricting portions 36A of the assembling pieces 36 are inserted into the insertion spaces 9 defined between the side walls 8 of the outer terminal 12 and the side walls 13A of the dielectric element 13.

[0047] As described above, according to the foregoing embodiment, the core 2 exposed from the braided wire 4 can have its fastened portion and a portion near it covered on four sides by the cover 14 in addition to the covering wall portion 21 of the outer terminal 12. Therefore, shielding characteristics such as a radiation characteristic can be remarkably improved. As a result, the radiation characteristic of high-frequency signals was further improved by 3 dB to 5 dB as compared with the terminal fittings in which no cover 14 is provided.

[0048] Since the cover 14 is mounted on the outer fastening portion 22 of the outer terminal 12 by the mount portions 37, the construction can be simplified without necessitating a separate mounting structure. Further, the mounting operation of the cover 14 itself

can be simplified and the cover 14 can be fitted on the outer terminal 12 without longitudinally bulging out and without changing the outer configuration of the outer terminal 12, with the result that the entire shielding terminal 10 can be made smaller.

[0049] In addition, the shielding terminal 10 can be securely grounded by employing a clip-lock construction for the mount portions 37.

[0050] Further, since the second displacement restricting portions 44 of the cover 14 are in contact with the bottom wall 12A of the outer terminal 12, a downward displacement of the cover 14 inside the outer terminal 12 can be restricted.

[0051] Furthermore, since the displacement restricting portions 36A of the cover 14 are inserted between the side walls 8 and 13, they keep the assembling pieces 36 from being bent inward of the outer terminal 12.

[0052] Further, since the covering portion 35 of the cover 14 is located in a position below the upper wall 7 of the outer terminal 12 as shown in FIG. 14, a rear edge 42 of the upper surface of the accommodating portion 20 can act as an engaging portion to be engaged with a resin locking portion (not shown) provided in a cavity of a housing when the shielding terminal 10 is accommodated into the cavity.

[0053] The present invention is not limited to the embodiment mentioned above. For example, the following embodiments are also embraced by the technical scope of the present invention as defined in the claims.

(1) Although only the upper wall of the wall covering portion 21 of the outer terminal 12 is open in the foregoing embodiment, the present invention is also applicable to shielding terminals having such a construction as illustrated in the description of the prior art, i.e. a construction in which both upper and lower surfaces are open where an end of a core is fastened.

(2) Although only the male shielding terminal is illustrated in the foregoing embodiment, the present invention may be applied to female shielding terminals.

(3) Although the cover 14 is provided with the two kinds of displacement restricting portions 36A, 44 in the foregoing embodiment, only either one of them may be provided according to the invention.

(4) The shield layer 4 has been described with reference to a braided wire. However, also a metal or conductive film may be used alternatively or additionally for the shield layer 4.

(5) The core 2 may be formed from a single strand or from a plurality of strands which may be bundled and/or twisted.

LIST OF REFERENCE NUMERALS

[0054]

1	shielding terminal
2	core
3	insulating layer
4	braided wire
5	sheath
8	side wall of an outer terminal
10	shielding terminal
11	inner terminal
12	outer terminal
12A	bottom wall of the outer terminal
13	dielectric element
13A	side wall of the dielectric element
14	cover
21A	open space
22	outer fastening portion (connecting portion)
35	covering portion
36	assembling piece
36A	displacement restricting portion
37	mount portion
44	second displacement restricting portion

Claims

1. A shielding terminal to be connected with an end of a shielded cable (1) comprised of a core (2) provided substantially in the center, a shield layer (4) coaxially surrounding the core (2) via an insulating layer (3), and a sheath (5) surrounding the shield layer (4), comprising:

   an inner terminal (11) to be connected with the core (2),
   a dielectric element (13) for at least partly accommodating the inner terminal (11),
   an outer terminal (12) which is adapted to at least partly accommodate the dielectric element (13) and to be connected with the shield layer (4), and
   a cover (14) having a covering portion (35) for substantially covering an open space around a section of the inner terminal (11) connected with the core (2), and at least one mount portion (37) mountable on a section or portion (22) of the outer terminal (12) to be connected with the shield layer (4),
   wherein at least one assembling piece (36) to be arranged substantially along a side wall (8) of the outer terminal (12) is formed with at least one displacement restricting portion (36A; 44) for restricting a displacement of the cover (14).

2. A shielding terminal according to claim 1, wherein the assembling piece (36) extends from the covering portion (35) of the cover (14).

3. A shielding terminal according to one or more of the preceding claims, wherein the displacement restricting portion (36A; 44) restricts the displacement of the cover (14) by being substantially held in contact with a connecting wall substantially connecting the side walls (8) of the outer terminal (12), the connecting wall being preferably a bottom wall of the outer terminal (12).

4. A shielding terminal according to claim 3, wherein each displacement restricting portion (36A; 44) comprises a first displacement restricting portion (36A) to be held in contact with the side wall (8) of the outer terminal (12) and a second displacement restricting portion (44) to be held in contact with the connecting wall.

5. A shielding terminal according to one or more of the preceding claims, wherein the displacement restricting portion (36A; 44) is to be inserted or fitted between the side wall (8) of the outer terminal (12) and a side wall (13A) of the dielectric element (13).

6. A shielding terminal according to claim 5, wherein the displacement restricting portion (36A; 44) prevents the assembling piece (36) from being bent inward of the outer terminal (12).

7. A shielding terminal according to claim 5 or 6, wherein the mount portions (37) comprise a clip-lock construction.

8. A method for connecting a shielding terminal with an end of a shielded cable (1) comprised of a core (2) provided substantially in the center, a shield layer (4) coaxially surrounding the core (2) via an insulating layer (3), and a sheath (5) surrounding the shield layer (4), comprising the steps of:

connecting an inner terminal (11) with the core (2),
at least partly accommodating the inner terminal (11) in a dielectric element (13),
at least partly accommodating the dielectric element (13) in an outer terminal (12) and connecting the outer terminal (12) with the shield layer (4), and
substantially covering an open space around a section of the inner terminal (11) connected with the core (2) by means of a cover (14) having a covering portion (35),
wherein the covering step comprises:
a step of mounting at least one mount portion (37) of the cover (14) on a section or portion (22) of the outer terminal (12) connected with the shield layer (4), and
a step of arranging at least one assembling piece (36) substantially along a side wall (8) of the outer terminal (12) for restricting a displacement of the cover (14).

9. A method according to claim 8, wherein the covering step further comprises a step of bringing at least one displacement restricting portion (36A; 44) into contact with a connecting wall substantially connecting the side walls (8) of the outer terminal (12), the connecting wall being preferably a bottom wall of the outer terminal (12).

FIG. 1

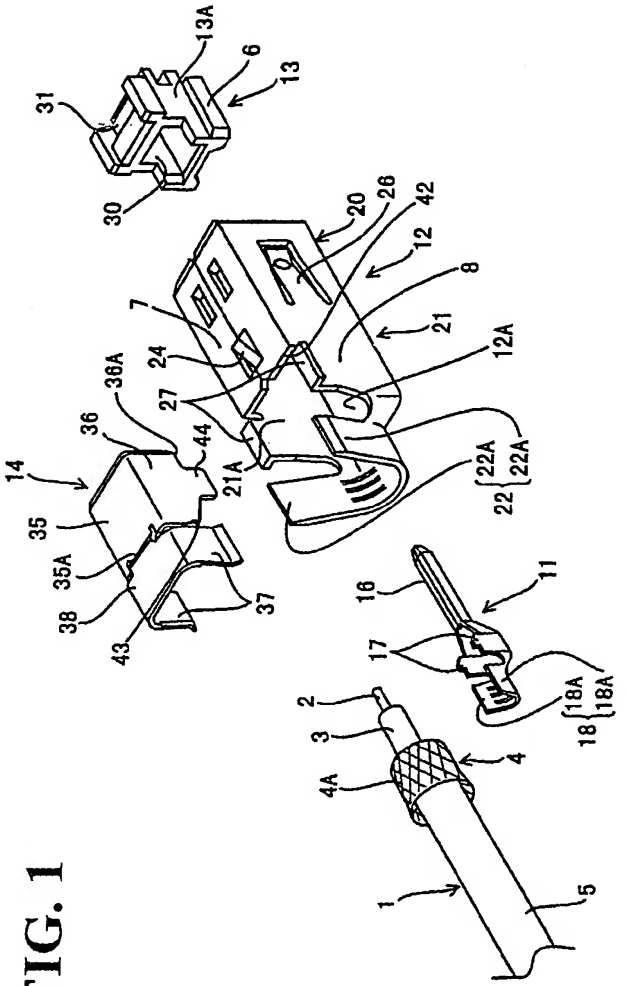


FIG. 2

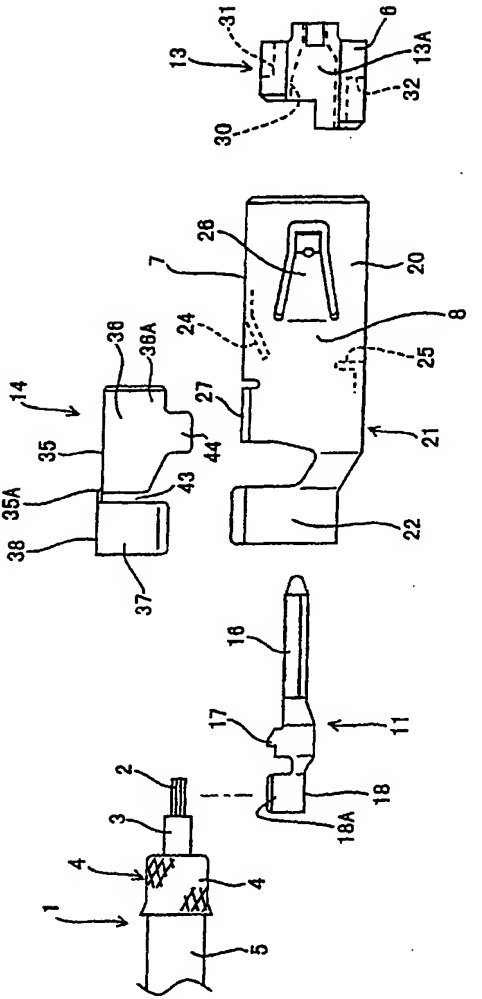


FIG. 3

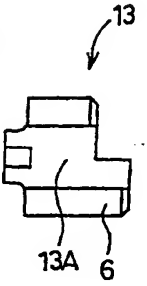


FIG. 4

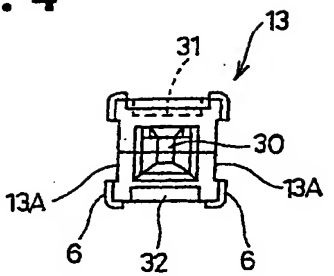


FIG. 5

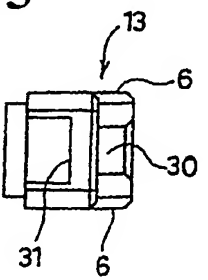


FIG. 6

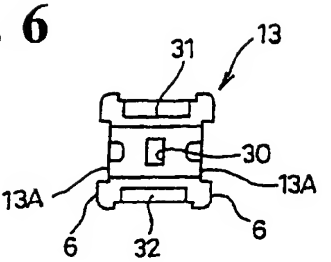


FIG. 7

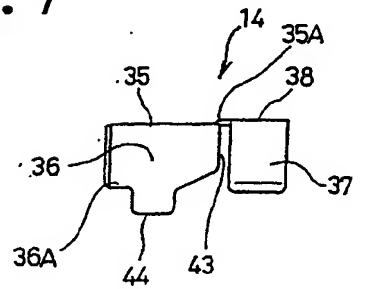


FIG. 8

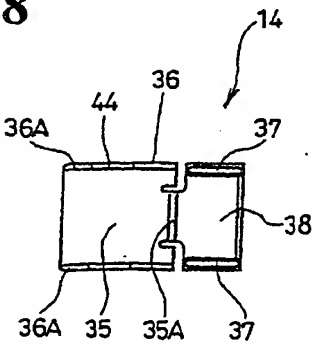


FIG. 9

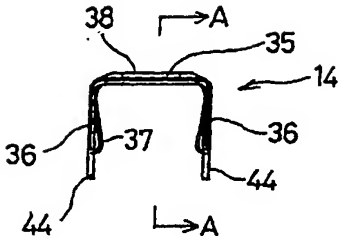


FIG. 10

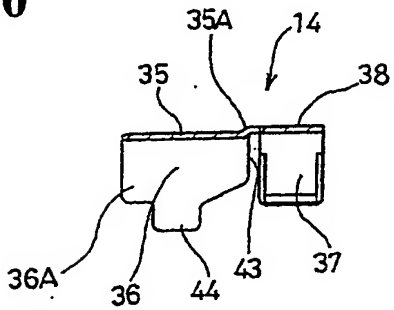


FIG. 11

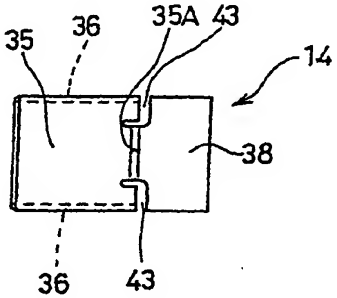


FIG. 12

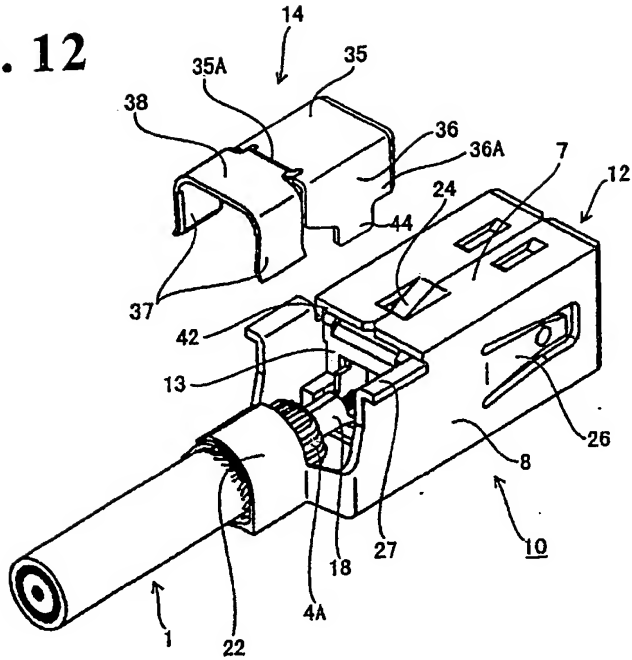
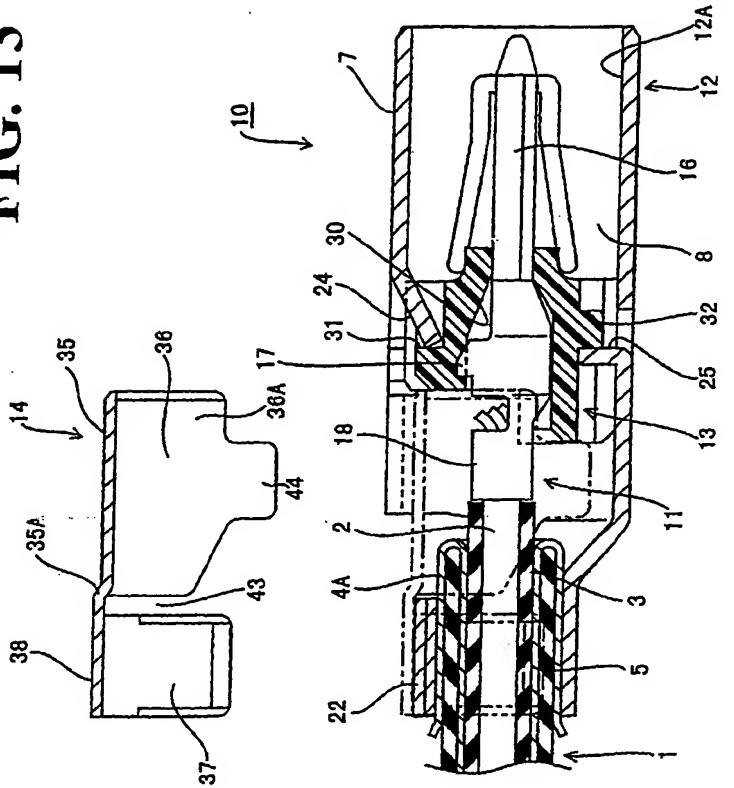


FIG. 13


10
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12A
12
16
8
30
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31
32
17
25
36
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14
36A
18
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35A
2
4A
43
3
38
5
22
37
1

FIG. 14

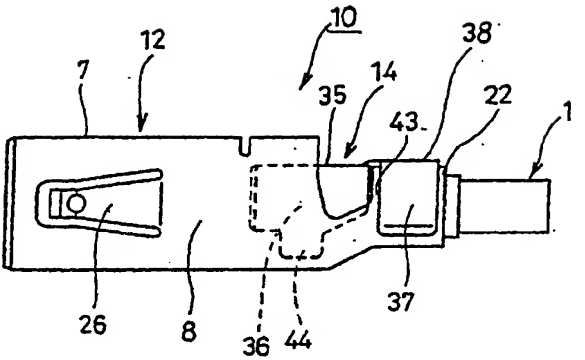

FIG. 15

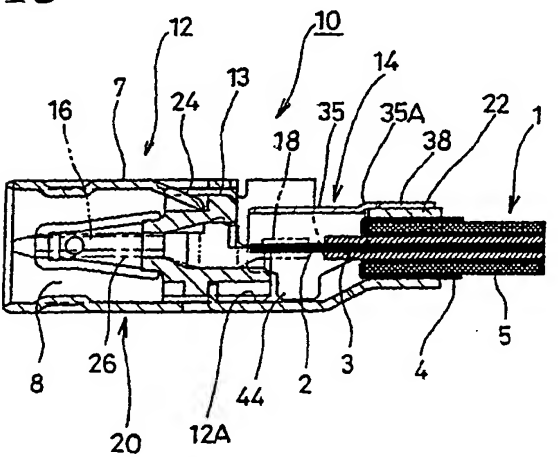

FIG. 16

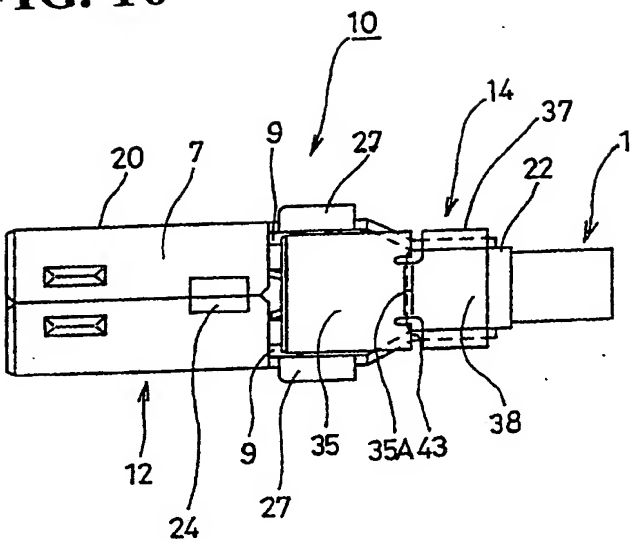

FIG. 17

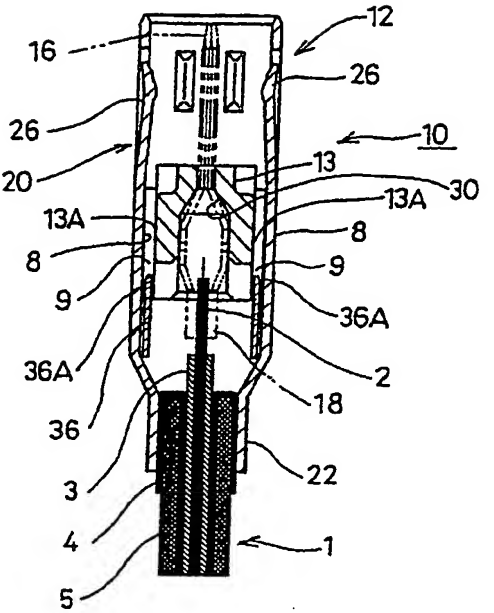

FIG. 18
PRIOR ART

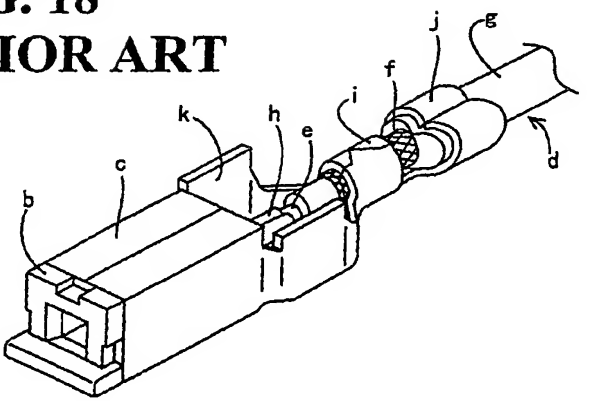

FIG. 19
PRIOR ART